

WE CLAIM:

1. A method for managing protocol information in a PAR-enabled device of a PNNI hierarchical network, the method comprising:
 - 5 assigning topology indicators to protocol information encapsulated in respective PAR PTSEs received by the PAR-enabled device from the network, the assignment of a said topology indicator to protocol information in a said PAR PTSE being dependent on the location of the network node which originated that PAR PTSE in the PNNI topology as seen by the PAR-enabled device; and
 - 10 supplying protocol information encapsulated in received PAR PTSEs to a protocol device associated with said PAR-enabled device in a manner dependent on the topology indicators assigned thereto.
2. A method according to claim 1 wherein the protocol information is supplied to the
15 protocol device in an order dependent on the assigned topology indicators.
3. A method according to claim 1 wherein the protocol information encapsulated in a received PAR PTSE is supplied to the protocol device with a tag comprising the assigned topology indicator.
- 20 4. A method according to claim 1 wherein each topology indicator comprises a distance value indicative of a logical distance in said PNNI topology between the PAR-enabled device and the network node which originated the PAR PTSE containing the protocol information to which that topology indicator is assigned.
- 25 5. A method according to claim 4 wherein said logical distance is defined as a function of hop count.
6. A method according to claim 4 wherein said logical distance is defined as a function of
30 PNNI costs.
7. A method according to claim 4 wherein said logical distance is defined as a function of dynamic metrics of the PNNI network.

8. A method according to claim 1 wherein each topology indicator comprises a level value indicative of the level in the PNNI hierarchy of the network node which originated the PAR PTSE containing the protocol information to which that topology indicator is assigned.
- 5 9. A method according to claim 8 wherein said level value is indicative of the level of said network node in the PNNI hierarchy relative to the level of said PAR-enabled device in the PNNI hierarchy.
10. A method according to claim 1 including, for protocol information in each of at least
10 some received PAR PTSEs to which an identical topology indicator has been assigned, testing for direct connectivity between said PAR-enabled device and another PAR-enabled device which first encapsulated that protocol information in a PAR PTSE, and supplying the protocol information in said at least some PAR PTSEs to the protocol device in a manner which indicates any protocol information for which said direct connectivity is established as preferred
15 over any protocol information for which said direct connectivity is not established.
11. A method according to claim 10 wherein the protocol information in said at least some PAR PTSEs is supplied to the protocol device in an order dependent on whether said direct connectivity is established.
12. A method according to claim 1 including supplying the protocol information to the
20 protocol device in response to a request from the protocol device.
13. A method according to claim 1 including assigning the topology indicators, and
25 supplying the protocol information to the protocol device, in response to a request from the protocol device.
14. A method according to claim 12 wherein the PAR-enabled device is configured as a Proxy-PAR server and the protocol device is configured as a Proxy-PAR client.
- 30 15. A method according to claim 1 wherein the step of assigning the topology indicators includes the step of deriving the topology indicators for the protocol information in respective PAR PTSEs.

16. A method according to claim 1 wherein said protocol information comprises IP information.

17. A method according to claim 1 wherein said protocol device comprises a router.

18. A method for facilitating the use of protocol information by a protocol device associated with a PAR-enabled device of a PNNI hierarchical network, the method comprising:

in the PAR-enabled device, assigning topology indicators to protocol information encapsulated in respective PAR PTSEs received by the PAR-enabled device from the network, the assignment of a said topology indicator to protocol information in a said PAR PTSE being dependent on the location of the network node which originated that PAR PTSE in the PNNI topology as seen by the PAR-enabled device, and supplying protocol information encapsulated in received PAR PTSEs to said protocol device in an order dependent on the topology indicators assigned thereto; and

in the protocol device, selecting, in dependence on said order, at least one further protocol device with which to establish a relationship from further protocol devices identified by the protocol information supplied by the PAR-enabled device.

19. A method for facilitating the use of protocol information by a protocol device associated with a PAR-enabled device of a PNNI hierarchical network, the method comprising:

in the PAR-enabled device, assigning topology indicators to protocol information encapsulated in respective PAR PTSEs received by the PAR-enabled device from the network, the assignment of a said topology indicator to protocol information in a said PAR PTSE being dependent on the location of the network node which originated that PAR PTSE in the PNNI topology as seen by the PAR-enabled device, and supplying protocol information encapsulated in each received PAR PTSE to said protocol device with a tag comprising the topology indicator assigned thereto; and

in the protocol device, selecting, in dependence on the tags supplied with the protocol information by the PAR-enabled device, at least one further protocol device with which to establish a relationship from further protocol devices identified by the supplied protocol information.

20. A PAR-enabled device for connection in a PNNI hierarchical network, the PAR-enabled device comprising:

memory for storing topology data, defining the PNNI topology as seen by the
PAR-enabled device when connected in a said network, and PAR PTSEs received by the
PAR-enabled device from the network; and

control logic configured to assign topology indicators to protocol information
5 encapsulated in respective received PAR PTSEs, the assignment of a said topology indicator to
protocol information in a said PAR PTSE being dependent on the location in said PNNI
topology of the network node which originated that PAR PTSE;

wherein the control logic is configured to manage the supply of protocol information
encapsulated in received PAR PTSEs to a protocol device associated with said PAR-enabled
10 device in a manner dependent on the topology indicators assigned thereto.

21. A PAR-enabled device according to claim 20 wherein the control logic is configured to
control the supply of protocol information encapsulated in received PAR PTSEs to said
protocol device such that the protocol information is supplied to the protocol device in an order
15 dependent on the topology indicators assigned thereto.

22. A protocol device for connection in a PNNI hierarchical network via a PAR-enabled
device according to claim 21, the protocol device comprising control logic configured to select,
in dependence on said order in which protocol information is supplied to the protocol device
20 by the PAR-enabled device in use, at least one further protocol device with which to establish a
relationship from further protocol devices identified by the supplied protocol information.

23. A PAR-enabled device according to claim 20 wherein the control logic is configured to
supply protocol information encapsulated in a received PAR PTSE to said protocol device with
25 a tag comprising the topology indicator assigned thereto.

24. A protocol device for connection in a PNNI hierarchical network via a PAR-enabled
device according to claim 23, the protocol device comprising control logic configured to select,
in dependence on the tags supplied with the protocol information received by the protocol
30 device from the PAR-enabled device in use, at least one further protocol device with which to
establish a relationship from further protocol devices identified by the received protocol
information.

25. A PNNI hierarchical network comprising a plurality of PAR-enabled devices and a plurality of protocol devices, each PAR-enabled device being associated with a said protocol device for communication over the network of protocol information generated by that protocol device, wherein said PAR-enabled devices include at least one PAR-enabled device according to claim 20.

26. A PNNI hierarchical network comprising a plurality of PAR-enabled devices and a plurality of protocol devices, each PAR-enabled device being associated with a said protocol device for communication over the network of protocol information generated by that protocol device, wherein:

said PAR-enabled devices include at least a first PAR-enabled device comprising: memory for storing topology data, defining the PNNI topology as seen by said first PAR-enabled device, and PAR PTSEs received by said first PAR-enabled device from the network; and control logic configured to assign topology indicators to protocol information encapsulated in respective received PAR PTSEs, the assignment of a said topology indicator to protocol information in a said PAR PTSE being dependent on the location in said PNNI topology of the network node which originated that PAR PTSE; the control logic being further configured to manage the supply of protocol information encapsulated in received PAR PTSEs to the protocol device associated with said first PAR-enabled device such that the protocol information is supplied to the protocol device in an order dependent on the topology indicators assigned thereto;

and wherein the protocol device associated with said first PAR-enabled device comprises control logic configured to select, in dependence on said order in which protocol information is supplied by said first PAR-enabled device, at least one further protocol device with which to establish a relationship from further protocol devices identified by the supplied protocol information.

27. A PNNI hierarchical network comprising a plurality of PAR-enabled devices and a plurality of protocol devices, each PAR-enabled device being associated with a said protocol device for communication over the network of protocol information generated by that protocol device, wherein:

said PAR-enabled devices include at least a first PAR-enabled device comprising: memory for storing topology data, defining the PNNI topology as seen by said first PAR-enabled device, and PAR PTSEs received by said first PAR-enabled device from the

network; and control logic configured to assign topology indicators to protocol information encapsulated in respective received PAR PTSEs, the assignment of a said topology indicator to protocol information in a said PAR PTSE being dependent on the location in said PNNI topology of the network node which originated that PAR PTSE; the control logic being further
5 configured to manage the supply of protocol information encapsulated in received PAR PTSEs to the protocol device associated with said first PAR-enabled device such that the protocol information encapsulated in a received PAR PTSE is supplied with a tag comprising the topology indicator assigned thereto;

and wherein the protocol device associated with said first PAR-enabled device
10 comprises control logic configured to select, in dependence on the tags supplied with the protocol information by said first PAR-enabled device, at least one further protocol device with which to establish a relationship from further protocol devices identified by the supplied protocol information.

28. A computer program product comprising a computer usable medium having embodied therein computer readable program code means for causing a processor of a PAR-enabled device of a PNNI hierarchical network to perform a protocol information management method comprising the steps of:

assigning topology indicators to protocol information encapsulated in respective PAR
20 PTSEs received by the PAR-enabled device from the network, the assignment of a said topology indicator to protocol information in a said PAR PTSE being dependent on the location of the network node which originated that PAR PTSE in the PNNI topology as seen by the PAR-enabled device; and

managing the supply of protocol information encapsulated in received PAR PTSEs to a
25 protocol device associated with said PAR-enabled device in a manner dependent on the topology indicators assigned thereto.